

Report to the Consumer on Water Quality

January 1, 2002 – December 31, 2002

Este informe contiene información muy importante sobre su agua beber. Tradúzcalo ó hable con alguien que lo entienda bien.

Díi kwe'é naaltsoos hasht'eelyaayí 'éi nit haz'ánigi tó baa 'áháyáá dóó yá'át'ééh óolzinigíi yaa halne'.

Doo bik'i'dinitjhgóó da, t'áá háida ta' níká'doolwot dóó hazhó'ó yee nit ch'ihodoo'áát.

Dear Water Consumer,

Last summer our community was faced with water resource challenges resulting from persistently dry seasons and low surface water levels. Thanks in a large part to your patient and diligent involvement in a community-wide water conservation effort, your Utilities Department was successful in maintaining a safe and adequate drinking water supply throughout the summer. On behalf of the Utilities Department, I would like to take this opportunity to express our appreciation for your efforts to consume water efficiently and reduce peak demand last summer.

At this time, I am pleased to present you the 2002 City of Flagstaff *Report to the Consumer on Water Quality*. This annual report outlines where your drinking water comes from, how it is treated, and the results of tests performed on the quality of Flagstaff drinking water. Additionally, as mandated by the U.S. Environmental Protection Agency, this report informs you of contaminant levels in your drinking water, as well as violations incurred last year, among other important health information.

In 2002, the Utilities Department incurred violations for exceeding the maximum allowable level of turbidity in treated surface water. The violations occurred over the course of three days, from August 14, thru August 16, and on September 10. Turbidity is a measurement of water clarity and is continually monitored as an indicator of other potential contaminants such as bacteria and protozoa. Our surface waters have low susceptibility for bacteria and protozoa, as there is little to no industrial, agricultural or domestic waste disposal into our surface waters. The possible health effects, of bacteria and protozoa contamination include nausea, diarrhea and vomiting. There were no cases of health problems reported in association with this violation, and it is important to point out that sampling prior to and following the violation period were negative. High turbidity levels are a result of pretreatment failure or filter anomaly, and last year's violations were directly associated with the intermittent operation of the Lake Mary Treatment Plant. In an effort to improve surface water treatment, the Department is in the process of bringing a new filter system on-line this spring at the Lake Mary Water Treatment Plant.

Additionally, in an effort to ensure the safety of your water system, the Utilities Department has initiated a Vulnerability Assessment to evaluate potential threats and identify corrective actions that can reduce or mitigate the risk of serious consequences from adversarial actions. Such an assessment for a water system takes into account the vulnerability of the water supplies, both ground and surface water, transmission, treatment, and distribution systems. Completion of the Vulnerability Assessment is anticipated summer 2003.

It is the obligation of the Utilities Department to provide a safe and adequate supply of drinking water. To help please our customers and meet our obligation, the Utilities Department strongly encourages public input and community participation on decisions affecting your water resources. Regular Water Commission meetings are held the third Thursday of each month. Meeting locations are posted on the official City bulletin board at City Hall. Meetings begin at 4:00 PM and you are always welcome.

Copies of this report are available at the Utilities Administration Office, City

Hall 211 West Aspen Avenue, Flagstaff, AZ 86001, or on our web-site at www.flagstaff.az.gov. I hope this report provides you with valuable information about your drinking water that is easy to understand. We hope the results found in this report confirm that you can count on the City of Flagstaff for quality at the tap.

Ron Doba,
Director
Utilities Department

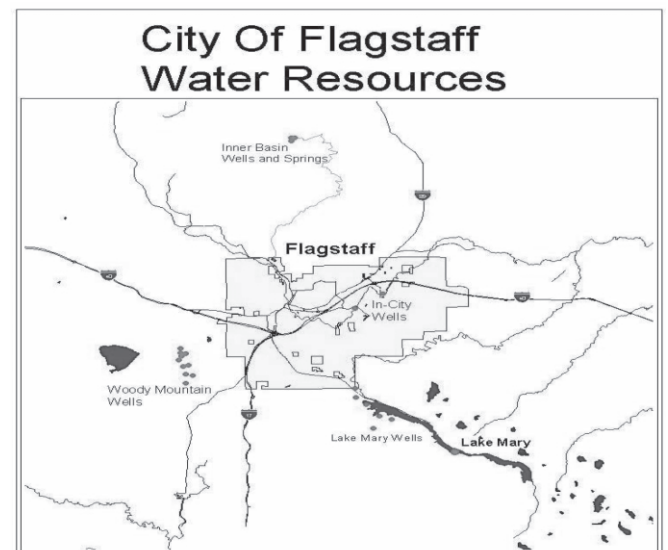
Water Sources

In 2002 the Utilities Department distributed approximately 2.87 billion gallons of water to Flagstaff water customers. Total water production remained the same as 2001 levels, which is attributable to a combination of effective water conservation strategies and drought conditions. A significant increase in water demand is expected during dry years, so the Utilities Department was pleased that production did not increase over last year. The Department finds that conservation programs have been effective with reducing summer peak demands, and anticipate implementing additional water conservation programs in the future.

The City of Flagstaff is supplied by surface water from Upper Lake Mary and the Inner Basin of the San Francisco Peaks. We also pump groundwater from the Woody Mountain Wellfield, Lake Mary Wellfield, and other Local wells, which tap the Coconino and Supai Aquifers. Two more local wells are anticipated to come on-line this year. These sources blend in the water distribution system and the amount of water coming from each source varies throughout the year.

What does the Following Table Mean?

The table shows the results of our water-quality analyses. Every regulated contaminant that we detected in the water, even in minute traces, is listed here. The Utilities Department conducted 1,921 tests for 104 contaminants in 2002. The information in the following table only addresses detected contaminants. We have chosen not to report information for contaminants



Upper Lake Mary, an important water source, was at its lowest level in 24 years last summer. Shown here at close to 9% of capacity.

tested for and not detected. The table contains the name of each substance, the highest level allowed by regulation (MCL), the ideal goals for public health, the amount detected, the usual sources of such contamination, footnotes explaining our findings, and a key to units of measurement.

Definitions:

Maximum Contaminant Level (MCL): The highest level of a regulated contaminant that is allowed in drinking water. The MCL is set as close to the MCLG (see below) as feasible using the best available treatment technology. The MCL is set at very stringent standards. To understand the possible health effects described for many regulated constituents, a person would have to drink 2 liters of water every day at the MCL level for a lifetime to have a one-in-a-million chance of having their health compromised.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. The MCLG allows for a margin of safety.

Action Level (AL): The concentration of a contaminant, which if exceeded, triggers treatment or other requirement that a water system must meet.

Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

Key to Table:

AL = Action Level	ppm = Parts per million, or milligrams per liter
MCL = Maximum Contaminant Level	ppb = Parts per billion, or micrograms per liter
MCLG = Maximum Contaminant Level Goal	<= Less than
NTU = Nephelometric Turbidity Units	>= Greater than
P/A = Presence / Absence	OC = Total Organic Carbon
pCi/l = Picocuries per liter (a measurement of radioactivity)	

Water Quality Table Footnotes:

- 1) The current EPA standard for arsenic in drinking water is 50 ppb. Effective 2006 this standard will be lowered to 10 ppb.
- 2) Copper and Lead contamination is typically derived from household plumbing and therefore tested from at the tap.
- 3) Turbidity is a measurement of the cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our surface water filtration system and an indicator of the absence of microbiological contamination.
- 4) 100% of the time. (In August there were 3 events >1.0 NTU)
- 5) 95% of the time. (In August the average dipped to 90.9%)
- 6) In two (2) consecutive measurements taken 15 minutes apart. (In August there were 4 events >1.0 NTU).
- 7) In two consecutive measurements taken 15 minutes apart at the end of the first four hours of continuous operation after the filter has been backwashed, or otherwise taken off-line. (In September there was 1 event >0.5 NTU).
- 8) No more than 5% of samples may be total coliform positive in a month. Every sample that has total coliforms must be analyzed for either *E. coli* or fecal coliforms to determine whether human or animal fecal matter is present (fecal coliforms and *E. coli* are part of the total coliform group). There may not be any fecal coliforms or *E. coli*. Any confirmed fecal coliform or *E. coli* analysis results in a violation.
- 9) Compliance with TTHMs and HAA5 is based on a running annual average. The running annual average during 2002 was 5.3 ppb for TTHMS, and 2.4 ppb for HAA5.
- 10) Although there is no collective MCLG for this group, there are individual MCLG's for some of the individual contaminants:
 - Haloacetic Acids: dichloroacetic acid (zero); trichloroacetic acid (0.3mg/L)
 - Trihalomethanes: bromodichloromethane (zero); bromoform (zero); dibromochloromethane (0.06 mg/L)
- 11) MCLG's were not established before the 1986 Amendments to the Safe Drinking Water Act. The standard for this contaminant was set prior to 1986.

Water Quality Table

Contaminant	Date Tested	Unit	MCL	MCLG	Highest Detected Amount*	Range	Major Sources	Violation
Inorganic Contaminants								
Arsenic	(9/5/00) ²	ppb	50 ¹	N/A	8.9 ²	1.2-8.9	Erosion of natural deposits; runoff from orchards; runoff from glass and electronics production waste.	NO
Barium	(9/5/00) ²	ppm	2	2	0.64 ²	0.02-0.64	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits	NO
Chromium	(9/5/00) ²	ppb	100	100	6.7 ²	<1 – 6.7	Discharge from steel and pulp mills; erosion of natural deposits	NO
Copper ⁹	6/3/02	ppm	Action Level	1.3	0.0048	<0.002 –	Corrosion of household plumbing systems; erosion of	NO
			1.3			0.0048	natural deposits; leaching from wood preservatives	
Fluoride	9/10/02	ppm	4	4	0.21	0.07 – 0.21	Erosion from natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories	NO
Lead ⁹	6/3/02	ppb	Action Level 15	Zero	0.00052	<.0005 – .00052	Corrosion of household plumbing systems; erosion of natural deposits	NO
Nitrate	6/5/02	ppm	10	10	1.7	<0.1 – 1.7	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	NO
Sodium	10/23/00 ²	ppm	N/A	N/A	7.3	3.3 – 7.3	Natural erosion	NO
Sulfate	6/3/02	ppm	N/A	N/A	14	2.18 – 14	Natural erosion, industrial wastes	NO

Microbiological Contaminants

Combined Turbidity ³	Every 4 hrs	NTU	1 ⁴	N/A			Soil runoff	YES
Combined Turbidity ³	Every 4 hrs	NTU	0.3 ⁵	N/A			Soil runoff	YES
Individual Filter Turbidity	Continual	NTU	1 ⁶	N/A			Soil runoff	YES
Individual Filter Turbidity	Continual	NTU	0.5 ⁷	N/A			Soil runoff	YES
Total Coliform (including fecal coliform and <i>E. coli</i>)	60 samples per month	P/A	<5 ⁶	Zero	2.9%	0 – 2.9%	Naturally present in the environment; fecal coliforms and <i>E. coli</i> come from human and animal fecal waste	NO

Disinfection By-products

TTHMs ⁷ (total trihalomethane)	Quarterly	ppb	100	None	16.2 ⁸	12.7 – 16.2	By-product of drinking water chlorination.	NO
HAA5 (Total Haloacetic Acids)	Quarterly	ppb					By-product of chlorine	NO

Radio Chemicals

Gross Alpha		ppb	100	None	1.3	0.9 – 1.3		NO
Combined Radium 226&228		Ppb			2.0	0.3 – 2.0		NO

Therefore, there is no MCLG for this contaminant.

*This column shows the results of tests on our finished water.

Other Contaminants

Radiochemicals – For the purpose of developing historical data, and in anticipation of future regulations, all points of entry (POE's) were monitored for Radiochemicals; Radium 226, Radium 228, Gross Alpha and Uranium during 2002. The detected amount is below the level that is being considered for their respective maximum contaminant levels (MCL's).

Additional Health Information

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791) or on the web at www.epa.gov/safewater.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as those with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS, or other immune system disorders. Some elderly and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care provider. EPA and Center for Disease Control guidelines, on appropriate means to lessen the risk of infection by *Cryptosporidium*, are available from the Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

Microbial Contaminants: Viruses, bacteria, and protozoan, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife. Microbial contaminants can cause short-term effects such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with compromised immune systems.

Inorganic Contaminants: Salts and metals, which can be naturally occurring or result from urban storm runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming. Certain inorganic contaminants consumed at levels in excess of the required MCL may result in skin damage, circulatory problems, liver problems, kidney damage, and increased risk of cancer.

Pesticides and Herbicides: Which may come from a variety of sources such as agriculture, storm-water runoff, and residential uses. Pesticides and Herbicides consumed at levels greater than the required MCL may result in increased risk of blood problem, reproductive difficulties, kidney and liver damage, and increased risk of cancer.

Synthetic and Volatile Organic Chemical Contaminants: Which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm-water runoff and septic systems.

Radioactive Contaminants: Which can be naturally occurring or be the result of oil and gas production and mining activities. Radioactive contaminants may result in an increased risk of getting cancer.

In order to ensure that tap water is safe to drink, the Environmental Protection Agency prescribes regulations, which limit the amount of certain contaminants in water provided by public water systems. Food

and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

Revised Drinking Water Regulations

Arsenic – Arsenic is a naturally occurring mineral known to cause cancer in humans at high concentrations. Epidemiological studies conducted in other countries indicate that high concentration of arsenic in drinking water, at several hundreds of parts per billion, have been shown to cause cancer. However there is insufficient data and information about lower levels of arsenic in the drinking water.

Recently the EPA lowered their standard for arsenic in drinking water from 50 ppb to 10 ppb, effective 2006. While your drinking water meets EPA's new standard for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

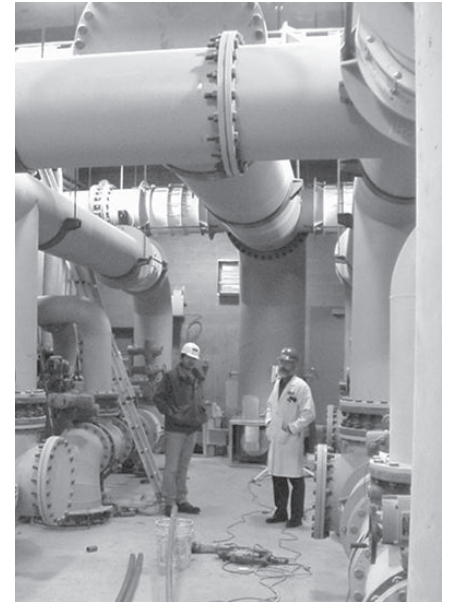
Haloacetic Acids – Haloacetic acids are disinfection by-products that are formed when chlorine is used as the disinfectant. These compounds can increase the risk of cancer, and became regulated as of January 1, 2002 with a MCL of 0.060 mg/L.

Maximum Residual Disinfection Level (MRDL) – Regulations for Maximum Residual Disinfection Level set a maximum limit for the running annual average MRDL at 4.0mg/L for chlorine. The average of samples taken in 2002 was 0.7mg/L chlorine, suggesting we shouldn't anticipate difficulty complying with this regulation.

TOC Removal Requirements – Control of disinfection by-product precursors has brought new regulations governing TOC removal requirements. TOC removal is accomplished through enhanced coagulation or enhanced softening. New regulations require a 50% TOC removal when the raw water TOC concentration is >8mg/L and alkalinity is <60mg/L. Violation shall occur when the ratio of the amount of actual TOC removal divided by the required amount of TOC removal is <1. The annual average TOC removal ratio for the year 2002 was 1.28. The range was 1.11 – 1.53.

Turbidity – As of January 1, 2002 the MCL for Combined Filter effluent was reduced to 1 NTU from 5 NTU for 100% of samples. The requirement for 95% of samples was reduced from 0.5 NTU to 0.3 NTU. Additionally, as of January 1, 2002 the Individual Filter effluent shall not exceed 1 NTU in two consecutive measurements 15 minutes apart, and shall not exceed 0.5 NTU in two consecutive measurements 15 minutes apart after 4 hours of continuous operation.

Thank you for reading this important information on your water's quality. We'll be happy to answer questions about the City of Flagstaff's water. Call Jack Rathjen at the Lake Mary Water Treatment Plant at (928-774-0262), or find information on your water system on the City of Flagstaff website at www.flagstaff.az.gov. Water quality data for community water systems throughout the United States is also available at www.waterdate.com.



The new filter building under construction at the Lake Mary Water Treatment Plant. Anticipated to come on-line April 2003



WATER QUALITY TABLE

(REPLACEMENT)

THIS WATER QUALITY TABLE IS PROVIDED TO TAKE THE PLACE OF THE INCOMPLETE TABLE PRINTED ON PAGE 8 OF THE *CITYSCAPE* NEWSLETTER. PLEASE REFER TO THE 'WATER QUALITY TABLE FOOTNOTES' FOUND ON PAGE 8.

Water Quality Table

Contaminant	Date Tested	Unit	MCL	MCLG	Highest Detected Amount*	Range	Major Sources	Violation
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Inorganic Contaminants

Arsenic	9/10/02	ppb	50 ¹	None	1.9	<1 – 1.9	Erosion of natural deposits; runoff from orchards; runoff from glass and electronics production waste.	NO
Barium	6/3/02	ppm	2	2	0.19	0.02- 0.19	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits	NO
Chromium	6/3/02	ppb	100	100	2.2	<1 – 2.2	Discharge from steel and pulp mills; erosion of natural deposits	NO
Copper ²	6/3/02	ppm	Action Level 1.3	1.3	0.0048	<0.002 – 0.0048	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives	NO
Fluoride	9/10/02	ppm	4.0	4.0	0.21	0.08 – 0.21	Erosion from natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories	NO
Lead ²	6/3/02	ppb	Action Level 15	Zero	0.52	<0.5 - 0.52	Corrosion of household plumbing systems; erosion of natural deposits	NO
Nitrate	6/5/02	ppm	10	10	1.7	<0.1 – 1.7	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	NO
Sodium	6/3/02	ppm	N/A	N/A	5.7	3.3 – 5.7	Natural erosion	NO
Sulfate	6/3/02	ppm	N/A	N/A	14	2.4 - 14	Natural erosion, industrial wastes	NO

Microbiological Contaminants

Combined Filter Turbidity ³	Every 4 hrs	NTU	1 ⁴	N/A	>1.0	0.05 - >1.0	Soil runoff	YES ⁴
Combined Filter Turbidity ³	Every 4 hrs	NTU	0.3 ⁵	N/A	>1.0	0.05 - >1.0	Soil runoff	YES ⁵
Individual Filter Turbidity ³	Continual	NTU	1 ⁶	N/A	>1.0	0.05 - >1.0	Soil runoff	YES ⁶
Individual Filter Turbidity ³	Continual	NTU	0.5 ⁷	N/A	0.58	0.05 – 0.58	Soil runoff	YES ⁷
Total Coliform (including fecal coliform and <i>E. coli</i>)	60 samples per month	P/A	<5% ⁸	Zero	2.9%	0 – 2.9%	Naturally present in the environment; fecal coliforms and <i>E. coli</i> come from human and animal fecal waste	NO

Disinfection By-products

TTHMs ⁹ (total trihalomethane)	Quarterly	ppb	80	NA ¹⁰	26	<0.5 – 26	By-product of drinking water chlorination.	NO
HAA5 ⁹ (total haloacetic acids)	Quarterly	ppb	60	NA ^{10,11}	21	<1.0 - 21	By-product of drinking water chlorination	NO

Radiochemicals

Gross Alpha	Varied 2002	pCi/ L	15	None	1.3	0.9 – 1.3	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known and alpha radiation	NO
Combined Radium 226&228	Varied 2002	pCi/ L	5	None	2.0	0.3 – 2.0	Erosion of natural deposits	NO

THE INCOMPLETE TABLE WAS IDENTIFIED AFTER PRINTING. PLEASE ACCEPT OUR APOLOGIES FOR THIS OVERSIGHT AND ANY INCONVENIENCE IT MAY HAVE CAUSED. FOR ANY QUESTIONS CONTACT THE UTILITIES DEPARTMENT AT 779-7646. THANK YOU!